User Manual

SR100C

No-Break™ DC UPS

* Please refer to additional user manual for SR100*i* models with communications options.

Label to be affixed here if battery condition test (BCT) enabled

Safety

The user is responsible for ensuring that input and output wiring segregation complies with local standards and that in the use of the equipment, access is confined to operators and service personnel. A low resistance earth connection is essential to ensure safety and additionally, satisfactory EMI suppression (see below).

HAZARDOUS VOLTAGES EXIST WITHIN A POWER SUPPLY ENCLOSURE AND ANY REPAIRS MUST BE CARRIED OUT BY A QUALIFIED SERVICEPERSON.

Electrical Strength Tests

Components within the power supply responsible for providing the safety barrier between input and output are constructed to provide electrical isolation as required by the relevant standard. However EMI filtering components could be damaged as result of excessively long high voltage tests between input, output and ground. Please contact our technicians for advice regarding electric strength tests.

Earth Leakage

Where fitted, EMI suppression circuits cause earth leakage currents which may be to a maximum of 3.5mA.

Ventilation

High operating temperature is a major cause of power supply failures, for example, a 10°C rise in the operating temperature of a component will halve its expected life. Therefore always ensure that there is adequate ventilation for the equipment. Batteries in particular suffer shortened lifetimes if subjected to high ambient temperatures.

Water / Dust

Every effort must be made in the installation to minimise the risk of ingress of water or dust. Water will almost always cause instant failure. The effects of dust are slower in causing failure of electronic equipment but all electrical equipment should be cleaned free of any dust accumulation at regular intervals.

Electromagnetic Interference (EMI)

Switching power supplies and converters inherently generate electrical noise. All wiring should be as short as practicable and segregated from all equipment wiring which is sensitive to EMI. Residual noise can be reduced by looping DC wiring through ferrite cores (sleeves). These are most effective as close to the power supply as possible and as many turns of the wire taken through the core (+ and - in the same direction) as the core will accommodate.

External fuse protection

Fuses or circuit breakers must be used in all battery circuits to protect against short circuits. External fuses should be used for power supplies/ chargers even though they are usually internally protected.

Connection polarity

It is critical to check the polarity carefully when connecting DC devices. Some Innovative Energies models have non-destructive reverse polarity protection but usually a reverse polarity connection will result in a blown fuse or serious damage to the device.

Glossary of terms used in our user manuals

PSU = power supply unit

BCT = battery condition test

ECB = electronic circuit breaker

ELVD = electronic low voltage disconnect

RPP = reverse polarity protection

EMI = electromagnetic interference

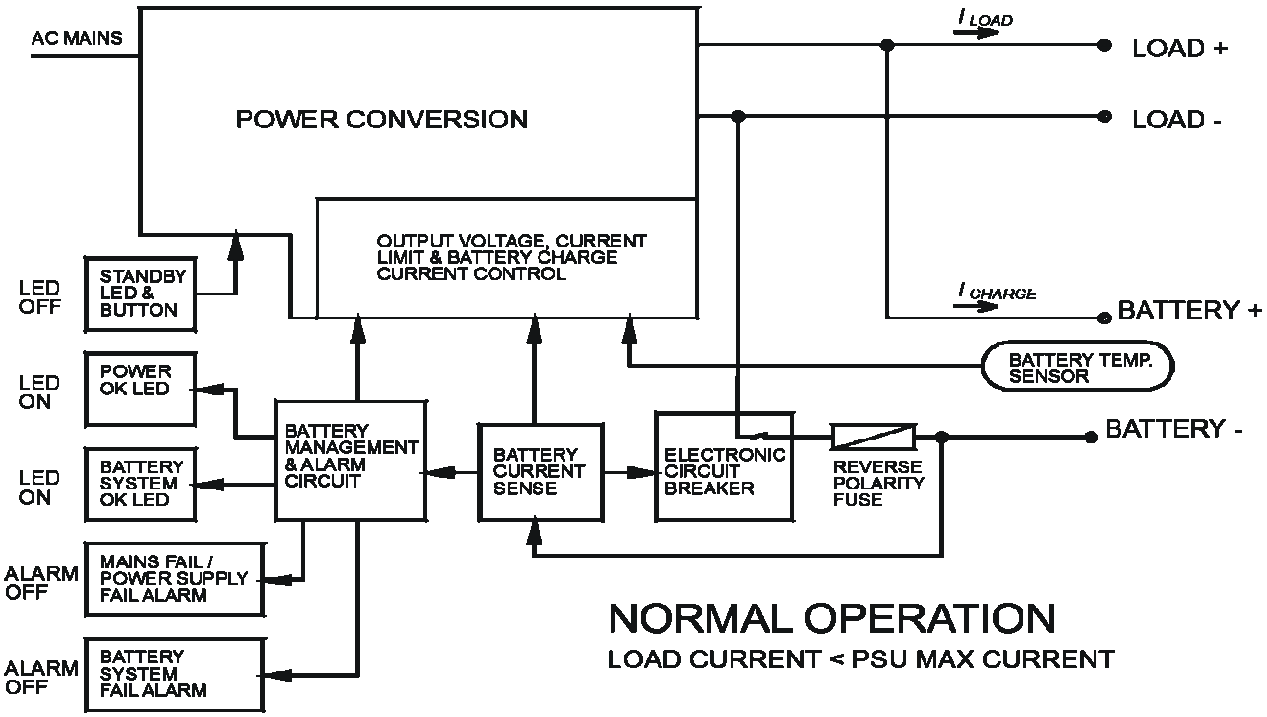
SNMP = Simple Network Management Protocol

LAN = local area network

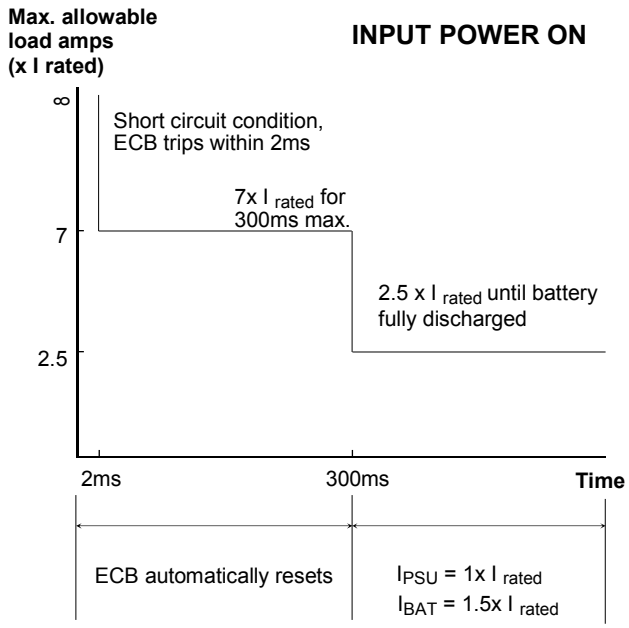
INTRODUCTION

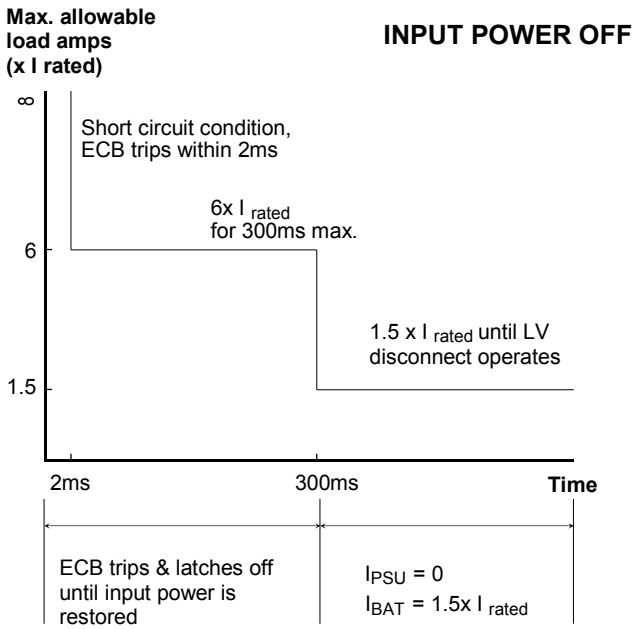
The ***No-Break ™DC*** power supply is designed to provide DC power to lead acid batteries for critical back up applications.

No-Break™ SYSTEM BLOCK DIAGRAM



OPERATION OF ELECTRONIC CIRCUIT BREAKER (ECB) FOR PROTECTION OF BATTERY CIRCUIT & BATTERY





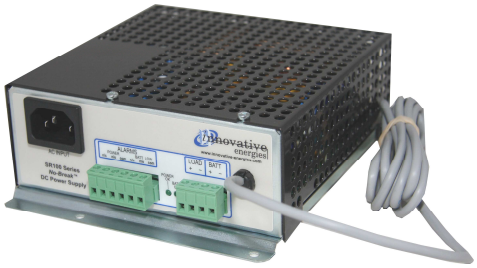
The ECB will operate on overcurrent as above & is also activated for the low voltage disconnect function on mains fail (no input power). It will reset when input power is restored, or can be manually reset by briefly shorting the **BAT-** and **LOAD-** terminals together when there is no input power.

innovative energies

Global Solutions Personal Focus

SR100C

incl. SR100i



Communication options available

- High performance *No-Break™ DC* UPS system
- Automatic battery condition test option
- Separate outputs for load and battery
- Battery detection - regular battery presence and battery circuit integrity checks
- Battery deep discharge protection
- ECB for battery overload & short circuit protection
- Reverse battery polarity protection
- Automatic temperature compensated output volts
- Power loss & battery system alarms
- No transition switching to backup battery
- LED flash codes for precise fault indication
- Optional communication interface allows remote monitoring & user control of BCT function - *i* versions

Z367

♦ 24 Month Warranty

SPECIFICATIONS All specifications are typical at nominal input, full load and at 20°C unless otherwise stated.

ELECTRICAL

Input voltage	
▪ standard	180V - 264VAC 45-65Hz
▪ optional	88V- 132VAC 45-65Hz,
Fusing / protection	Input fuse & varistor Output fuse & ECB for battery circuit
Isolation	1KV DC input - output / earth
Efficiency	≥ 85%
Inrush current	<30A, 1.8ms
Output power	100W
Output voltage	13.8, 27.6, 34.5, 41.4, 55.2VDC
Voltage adj. range	85 - 105% of Vout
Temp. compensation	Temperature sensor on 1.7m lead with adhesive pad: -4mV / °C / cell ±10%
Current Limit	**PSU:** 100% rated current **Battery:** 25-100% PSU current
Line regulation	<0.04% over AC input range
Load regulation	<0.5% open circuit to 100% load
Noise	<0.3%
Transient response	200mV over / undershoot, load step 20-100%, 400us settling time
Thermal protection	Yes, self-resetting
Hold-up time	15 - 20 ms (nom. - max. Vin) without battery

STANDARDS

EMI	to CISPR 22 / EN55022 class A, C-tick compliance
Safety	to IEC950 / EN60950 / AS/NZS3260

No-Break™ FUNCTIONS AND ALARMS

Battery charge current limit	100% of PSU rated current unless specified on ordering
Reverse polarity protection	Battery reverse connection will open internal fuse (and produce alarm)
Battery monitoring	Detects for presence of battery on start up, then every 60 minutes when charge current < 200mA
Battery circuit protection	Electronic circuit breaker (ECB) operates under the following conditions:
- low battery volts	• battery voltage drops to 1.67V/cell - auto reset on power on
- overload	• < 300ms for I bat > 6 x $I_{PSU\ rated}$, allows ~1.5x rated PSU current from battery without acting,
- short circuit	• < 2ms, backed up by fuse
LED indication	Green: Power OK Green: Battery OK
Alarms	• Power OK (Mains/PSU fail) • Battery System OK - alarms when battery voltage low (on mains fail) , battery missing, battery circuit wiring faulty, BCT fail (if enabled)
Alarm relay contacts	C - NO - NC full changeover rated 30VDC,2A /110VDC,0.3A/125VAC,0.5A
Battery condition test (BCT)	Standard on SR100 *i* versions BCT relay contact provided to control an external test load.

PHYSICAL

AC input connector	IEC320 input socket (similar to PCs etc.)
DC connections	Plug-in style socket & mating screw terminal block: (max. wire 2.5mm² / way)
Alarm connections	Plug in screw terminal block
Enclosure	Zinc plated & powder coated steel
Dimensions	147W x 177D x 62H mm
Weight	0.95 Kg

Specifications are subject to change without notice. No liability accepted for errors or omissions.

100 Watt
No-Break™ DC charger for lead acid batteries

SR100C

incl. SR100i

STANDARD MODEL TABLE

MODELS	DC Output				
	Output (V)	PSU Rated (A)	Charge Limit (A) *1	Recomm. Load (A)	Peak load on power fail (A)
SR100C12	13.8	7.5	7.5	6.0	11
SR100C24	27.6	3.7	3.7	3.0	5.5
SR100C30	34.5	2.9	2.9	2.3	4.3
SR100C36	41.4	2.4	2.4	1.9	3.6
SR100C48	55.2	1.9	1.9	1.5	2.8

SR100*i* with RS485 serial port

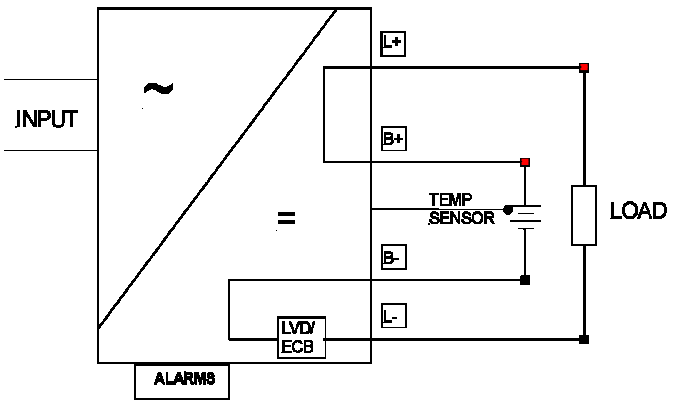
ENVIRONMENTAL

Operating temperature	***Standard:*** 0 to 50 °C ambient at full load ***Option - Low temp:*** -20 to 50 °C ambient at full load, add suffix **-LT** De-rate linearly >50 °C to 0 load @ 70 °C
Storage temperature	-20 to 85 °C ambient
Humidity	0 - 95% relative humidity non-condensing
Cooling	Natural convection

OPTIONS

Battery Condition Test	Add option **SFMCT xxxxx** on SR100C. Default setting 20mins/28 days. **SR100*i* :** default setting is scheduled BCT disabled at start up
Communication Port for *-i* & V versions	Choice of RS485, RS232, LAN+ (SNMP), LAN (ASCII)
Modbus converter	For **SR100*i* ... 485**, use protocol converter, with programming port for PC. ***Power MBLink*** setup software supplied. add **+PROTOCONMB** or add **+PROTOCONMB-OE** with ethernet port
*1 **Charge current limit**	25% & 50% settings available

SCHEMATIC BLOCK DIAGRAM



CABINET OPTIONS

19"Rack Mount	2U sub rack option: add **SR-RM2U** Optional V/I meter for subrack**: SR-METER**
Wall Mount Enclosure	PSU may be fitted into enclosure with MCBs and terminals: add **SEC-SR**

ACCESSORIES SUPPLIED

Mounting feet together with screws
AC power cord 1.5m with IEC320 socket & AUS/NZ plug
Mating screw terminal plug for DC output
Mating screw terminal plug for alarms

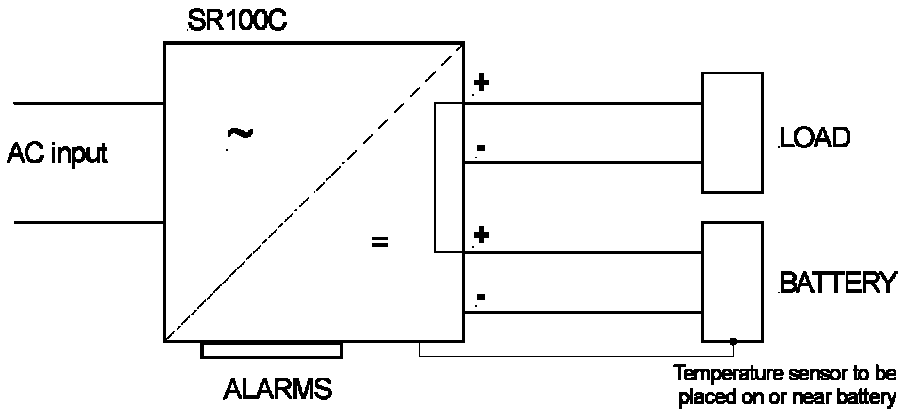
MODEL CODING AND SELECTION CHART

SR100C 12 T X G-485

Optional Communications Interface Port	For SR100*i* versions: **485** = RS485 **232** = RS232 **LAN** = Ethernet (ASCII) **LAN+** = Ethernet (SNMP)	
Input voltage and front panel standby switch	**Blank =** 230V AC no switch **G** = 110V AC no switch **J** = 88-135VDC no switch	
Output DC connector	**X** = Plug in /screw terminal block	
Temperature Compensation	**T** = Yes	Blank = No
DC output (nominal battery voltage)	**12, 24, 30, 36, 48V**	
Function	***C*** = ***No-Break™*** DC PSU/charger ***i*** = **C** with serial or ethernet communications port	
Power	**100W**	

Installation Instructions

CONNECTION DIAGRAM



CONNECTION & INITIAL TESTING

1 Check input and output voltages of system, ensure that they match the equipment. All loads should be isolated.
2 Check polarity of all wiring. Place temperature sensor probe near or on batteries.
3 Plug in ac input and turn power on. Both LEDs will light up after approx. 4 sec, "BATTERY OK" LED will go out after another 10 secs (since there is no battery connected). DC output voltage should appear at both load and battery outputs (ensure screws are tightened down on the connector block).
4 Turn off input power.
5 Connect battery.
6 Check that ELCB (internal electronic circuit breaker) closes by shorting together the BATTERY –ve and LOAD –ve terminals for about 2-3 sec. You will hear a relay operate and both LEDs will light up. If this does not happen, there is a fault in the wiring or the internal battery protection fuse is ruptured (see Note 2 below). The battery voltage will then appear at the load terminals and the "BATTERY OK" relay energises. The "POWER OK" LED stays on for about 30 seconds.
7 Connect load wiring to **LOAD+** and **LOAD-** terminals.
8 Turn on ac power.
9 After the batteries are fully charged, check that the battery continues to power up the load when the input power is turned off.

NOTES

1 Fuse Ratings

Fuse ratings should be calculated based on the load requirements. Note that the system is capable of allowing 2.5 x $I_{PSU\ rated}$ when mains power is on and 1.5 x $I_{PSU\ rated}$ when running off the battery only.

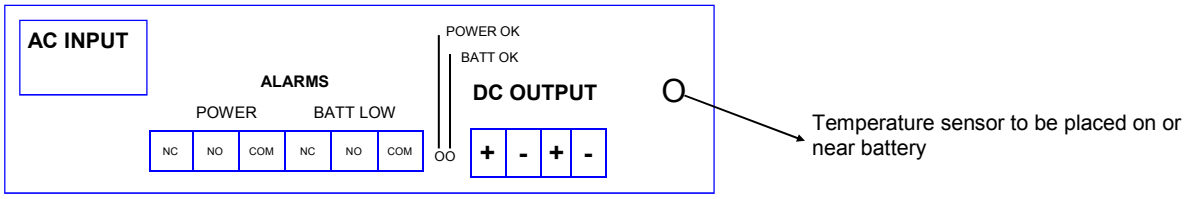
2 Reverse polarity protection

If the battery is connected in reverse, the internal battery protection fuse may be ruptured and the unit should be returned to the manufacturer for repair. If the fuse is good, the voltage measured as at step 3 above should be exactly the same on both the load and battery outputs.

Alarms & LED Indication

ALARM CONNECTIONS

Relay contacts shown in **de-energised** state (ie when there is a fault condition).
Alarm relays are **energised** when system is operating normally.



ALARMS

POWER: Loss of mains input power

NOTE: This alarm has 30 second delay before activation upon mains failure.

BATTERY LOW: 1. battery voltage = 1.8V/cell (for 2V cells) - operates only when no mains power present.
2. battery missing or fault in battery circuit wiring (alarm does not activate for up to battery detection interval time).

LED INDICATION

Power OK LED	Battery OK LED	Power Alarm	Battery Low Alarm	Condition
☀	☀	Normal	Normal	**System Normal**: AC power is on, PSU output is OK, battery circuit is OK and battery voltage is > V Battery Low.
☀	◑	Normal	Normal	Battery detection test imminent (LED begins flashing prior to test).
☀	○	Normal	Alarm	System AC power is on, PSU output is OK but either: 1. Internal battery fuse has opened (only if battery has been reverse polarity connected), ***or*** 2. Battery circuit open - battery missing, or fuse / circuit breaker / wiring fault.
○	☀	Alarm	Normal	Either AC power has failed, *or* PSU has failed. Battery system is OK
○	◑	Alarm	Alarm	AC Power is off / DC has failed **and** battery has discharged to ≤ V Battery Low, unit will continue delivering battery current until low level initiates ELVD.
○	○	Alarm	Alarm	AC Power is off / DC has failed **and** ELVD has activated and disconnected battery from load. Residual current drain on battery following ELVD <1 mA.
✳	✳	Normal	Normal	Battery Condition Test is in progress: LEDs flash alternately
☀	✳	Normal	Alarm	Battery Condition Unserviceable: failed to maintain terminal voltage during battery condition test

LEGEND : ☀ =On ◑ =Flashing ✳ =Flashing Slowly ○ =Off

Please note that the last three conditions apply only if the battery condition test option is enabled.

No-Break DC Settings

Parameter	*Default Settings*					*Actual settings if different from default*
V nominal	**12**	**24**	**30**	**36**	**48**	
V output (20°C)	13.8	27.6	34.5	41.4	55.2	
BatDetect (mins)	60	60	60	60	60	
Vpres:	12.2	24.4	30.5	36.6	48.8	
Vbatl:	11	22	27.5	33	44	
Vshutd:	11.5	23	28.7	34.5	46	
Vdisco:	10	20	25	30	40	
Bccl (%)	100	100	100	100	100	
Comms	M	M	M	M	M	
BCTim (mins)	20	20	20	20	20	
CC Mins:	40	40	40	40	40	
CC Hrs:	23	23	23	23	23	
CC Days:	27	27	27	27	27	
MfiBCT:	30	30	30	30	30	

BatDetect: Time between battery detections

Vpres: Voltage threshold for battery detection and BCT. Note that if the voltage drops to this level during a BCT the test is aborted and the **BAT LOW** alarm shows.

Vshutd: Internal voltage level of the power supply during battery detection and battery condition tests.

Vbatl: **BAT LOW** alarm voltage level

Vdisco: Voltage at which the load is disconnected from the battery during mains fail

Bccl: Battery charge current limit as percentage of the rated power supply current

Comms Communication mode of PSU: F = continuous data stream of status
M = responds only to request made by a controller

BCTim: Length of battery condition test

CC Mins: Time in minutes between automatically scheduled BCTs

CC Hrs: Time in hours between automatically scheduled BCTs

CC Days: Time in days between automatically scheduled BCTs

Note: The total time interval between battery condition tests (BCTs) is the sum total of the three 'CC' settings

MFiBCT: Time in minutes before the mains fail check during the BCT (only applicable to SR100)

Scheduled BCT disabled

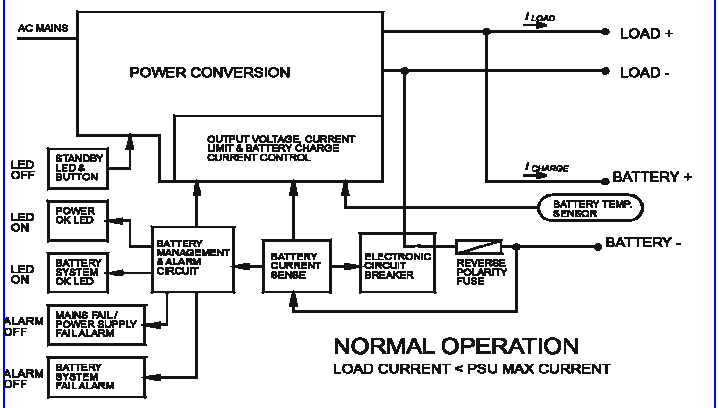
SNMP VERSIONS ONLY:

Alarm mask 1048187

DHCP enabled

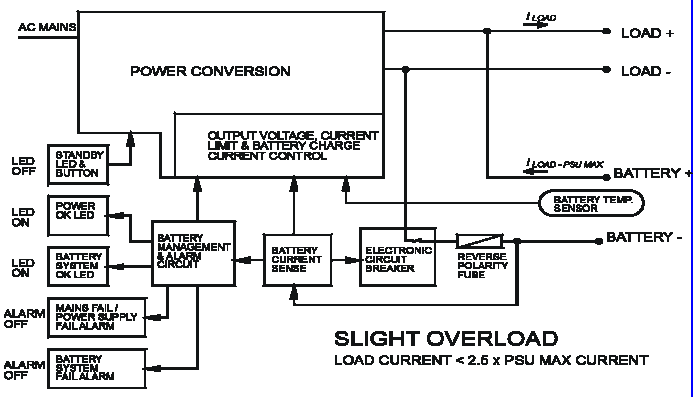
Operating States

These charts are system status diagrams showing current flows, alarm status & LED indication status for each state



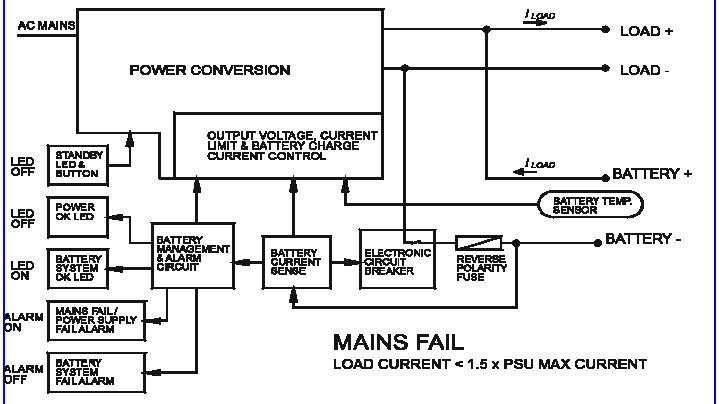
NORMAL OPERATION

LOAD CURRENT < PSU MAX CURRENT



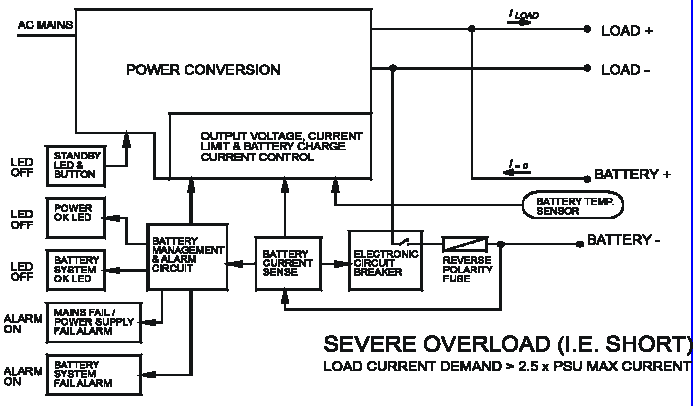
SLIGHT OVERLOAD

LOAD CURRENT < 2.5 x PSU MAX CURRENT



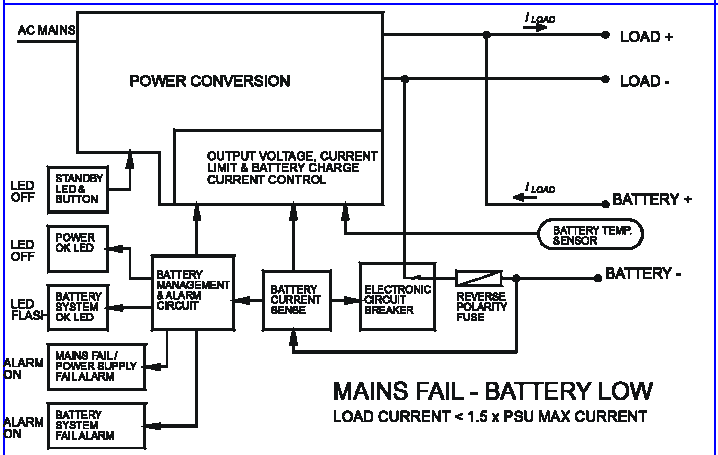
MAINS FAIL

LOAD CURRENT < 1.5 x PSU MAX CURRENT



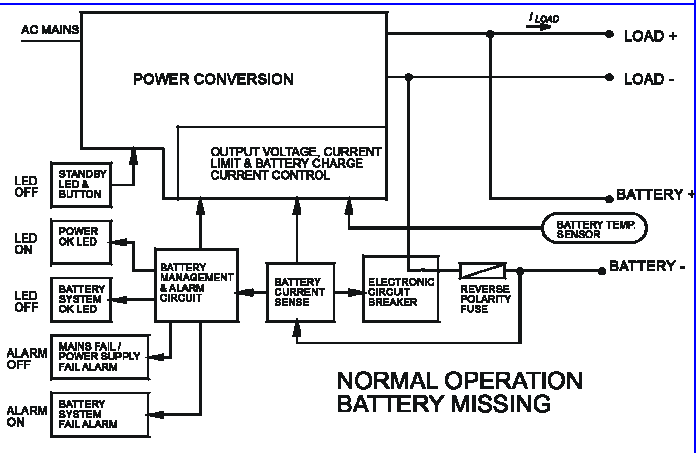
SEVERE OVERLOAD (I.E. SHORT)

LOAD CURRENT DEMAND > 2.5 x PSU MAX CURRENT

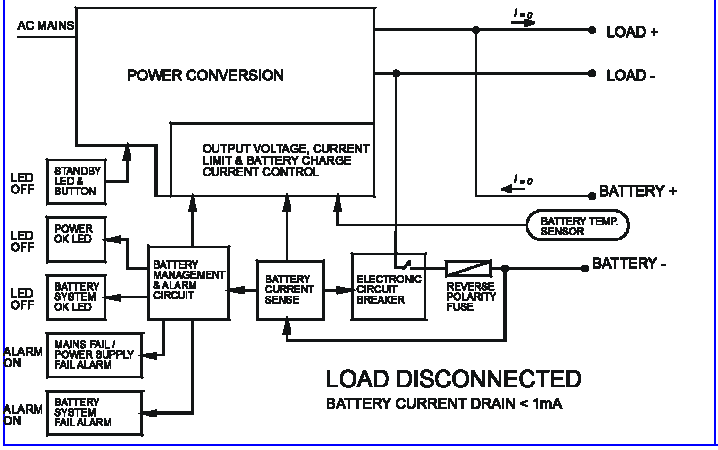


MAINS FAIL - BATTERY LOW

LOAD CURRENT < 1.5 x PSU MAX CURRENT

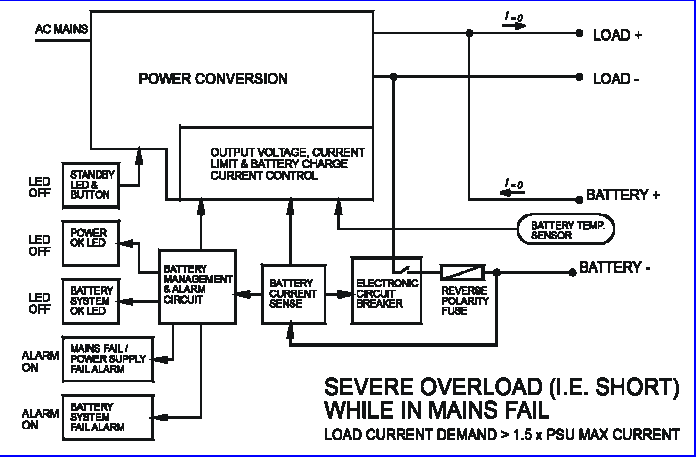


NORMAL OPERATION
BATTERY MISSING



LOAD DISCONNECTED

BATTERY CURRENT DRAIN < 1mA

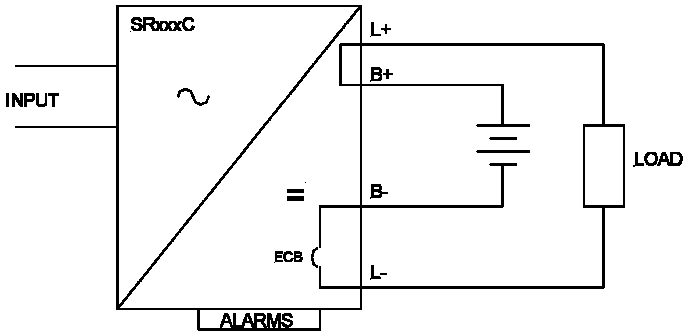


SEVERE OVERLOAD (I.E. SHORT)
WHILE IN MAINS FAIL

LOAD CURRENT DEMAND > 1.5 x PSU MAX CURRENT

#1. 1 x *No-Break™DC* charger and 1 x battery bank

This is the basic connection which is most commonly used, and provides adequate protection for the majority of systems requiring DC back up in the event of a mains power failure.

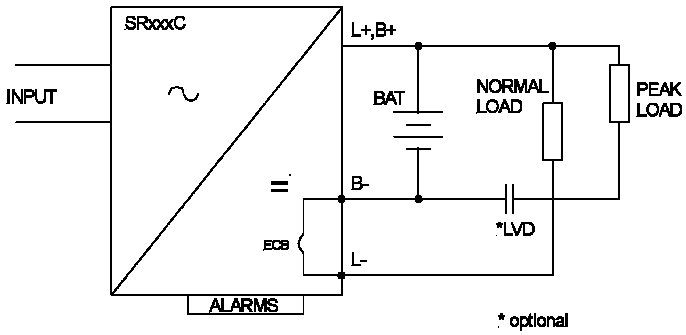


Single battery DC backup system

Alarms Available	
Power OK	YES
Battery Missing	YES
Battery Low	YES
Battery Condition Test Fail	YES

#2. Peak load connection using 1 x *No-Break™DC* charger

Use this connection when there is a connected load with a peak current likely to exceed 1.5 times the rated current of the charger. Standing loads are connected normally and an optional external low voltage disconnect may be used for the peak load.



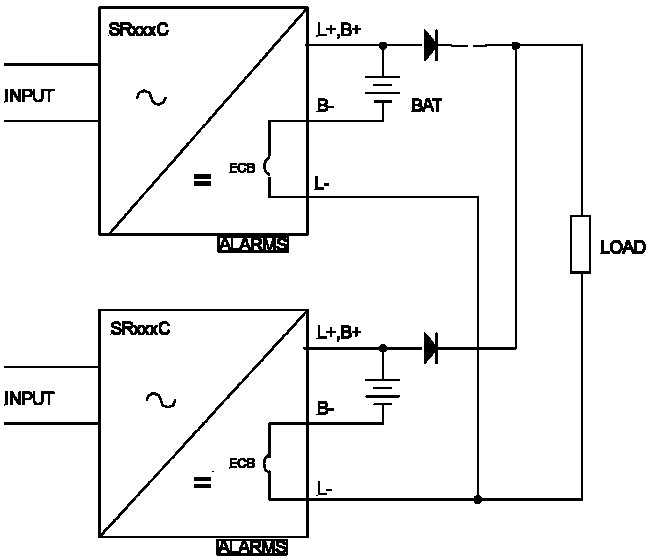
DC backup for loads with high peaks

*1 provided peak loads have no standing load component

Alarms Available	
Power OK	YES
Battery Missing *1	YES
Battery Low	YES
Battery Condition Test Fail	YES

#3. N+1 of two complete *No-Break™DC* systems with each one capable of supplying the load

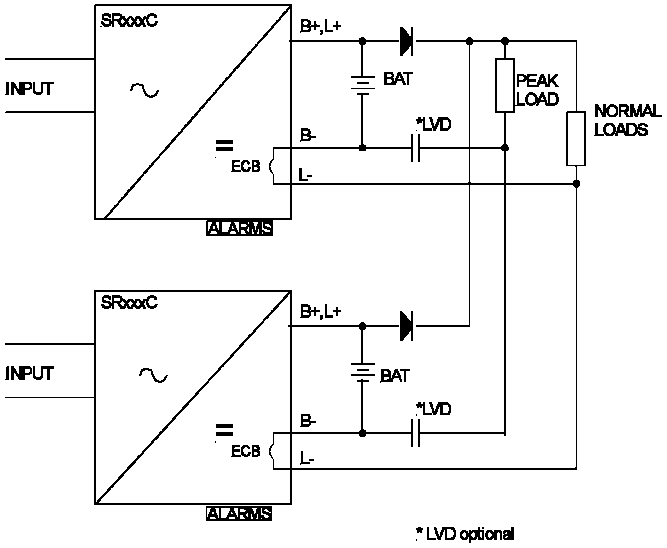
NEGATIVE COMMON



N+1 redundancy for critical applications

Alarms Available	
Power OK	YES
Battery Missing	YES
Battery Low	YES
Battery Condition Test Fail	YES

#4 N+1 connection for peak loads using two complete *No-Break™DC* systems with each one capable of supplying the loads



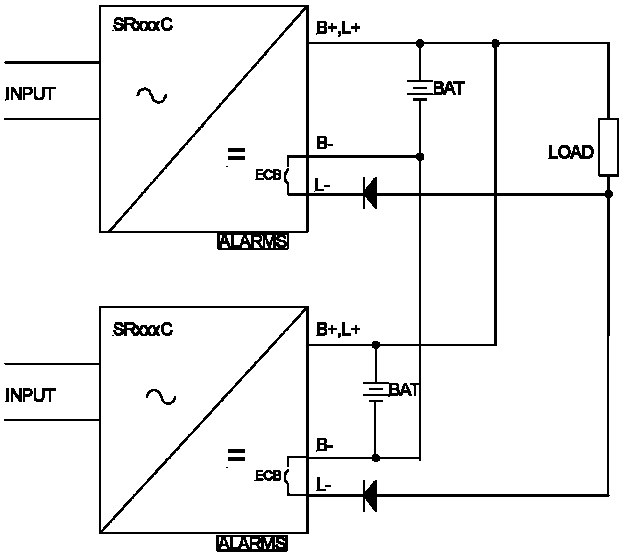
N+1 redundancy with peak loads

*1 provided peak loads have no standing load component

Alarms available	
Power OK	YES
Battery missing *1	YES
Battery low	YES
Battery condition test fail	YES

#5. N+1 of two complete *No-Break™DC* systems with each one capable of supplying the load

POSITIVE COMMON



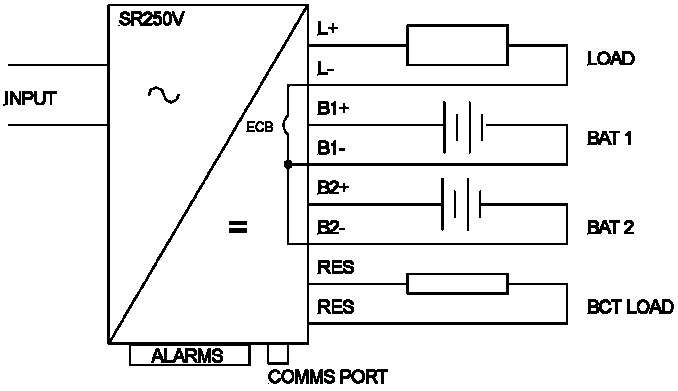
For mission critical applications

Alarms available	
Power OK	YES
Battery missing	NO
Battery low	YES
Battery condition test fail*[1]	YES

*[1] interlock circuit required for automated BCT

#6 1 x *No-Break™DC* charger and 2 x battery banks

The **SR250**xxx**V** ***No-Break™DC*** UPS is designed to provide superior battery backup availability without having to use two power supplies. Dual battery banks and automatic battery condition testing reduce the risk of battery failure for critical applications.



Enables more accurate testing of battery condition

Alarms Available	
Power OK	YES
Battery Missing (B1&B2)	YES
Battery Low (B1&B2)	YES
Battery Condition Test Fail (B1 & B2)	YES

TERMS OF WARRANTY

Innovative Energies Ltd warrants its power supplies for 24 months (two years) from date of shipment against material and workmanship defects.

Innovative Energies' liability under this warranty is limited to the replacement or repair of the defective product as long as the product has not been damaged through misapplication, negligence, or unauthorized modification or repair.

Thank you for purchasing from Innovative Energies.

We trust your power supply will exceed your expectations and perform for years to follow.

Sincerely,
The Innovative Energies team.

Innovative Energies Limited

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